Purpose: To evaluate the feasibility and accuracy of an LED-based Optically Stimulated Luminescence (OSL) system for measuring computed tomography (CT) radiation profile width.

Methods: The OSL detector strips used consisted of a layer of Al_2O_3:C powder incorporated into a plastic tape. The strips were 150 mm long with a width of 4-5 mm and thickness of 0.3 mm. The 64-slice CT dose profiles were measured by irradiating the OSL strips both free-in-air and inside the PMMA head and body phantoms. Three separate OSL strip measurements were performed for each scan condition. The exposed strips were then read out using a custom built LED-based reader system, which operated for 150 mm in 0.25 mm steps, providing 600 data points along the OSL strip in 60 sec. The width of the CT radiation profiles was determined from the full width half maximum (FWHM) at different nominal beam collimations. The results were compared to those obtained from digitized film profiles and ionization chamber point measurements (0.3 cc ionization chamber).

Results: By comparing the FWHM values of OSL and digitized film measured free-in-air, the system accuracy was verified with results $< \pm 2.2\%$ for nominal beam widths of 5, 10, 20 and 40 mm. The relative OSL response as a function of phantom positions was verified by comparing the FWHM values in phantom measurements using OSL and ionization chamber. The results agreed well within 7.6%.

Conclusions: The proposed method of using an LED-based OSL system to determine the FWHM of the CT radiation profile has a high accuracy and shows good agreement with the conventional film measurements and the more advanced point-dose methodology proposed by TG 111. Combined with the simple calibration, it gives this work a great potential to be used in routine clinical quality assurance check.